
Remittances And Income Inequality in Selected Countries in Sub-Saharan Africa (SSA)

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ABSTRACT: This study examines the relationship between remittances and income inequality in ten selected countries in Sub-Saharan Africa (SSA) from 2000 to 2023 using data from the World Bank and WIID. Anchored on the Dynamic Migration Model and employing an ex-post facto design, this study utilized cross-sectional dependence, unit root, and Granger causality tests, alongside Panel Estimated Generalized Least Squares (EGLS) with cross-section Seemingly Unrelated Regression (SUR) weights to account for heteroskedasticity and cross-sectional dependence across countries. Income inequality (dependent variable) was measured by the Gini Index, with remittances, GDP per capita growth, and aging population as explanatory variables. The findings reveal that remittances have a negative and statistically significant impact on income inequality, whereas GDP per capita growth and an aging population have no statistically significant impact on income inequality. However, no causal relationship was found between remittances and inequality. This study concludes, therefore, that remittances play an important role in reducing income inequality in Sub-Saharan Africa. It recommends strengthening formal remittance channels, negotiating intergovernmental agreements with host countries, and expanding mobile money platforms to enhance remittance inflows.

KEYWORDS: Remittances, Income Inequality, Sub-Saharan Africa, Gini Index

INTRODUCTION

The unimaginable economic growth in recent years has not helped reduce the gap between the rich and the poor within countries or between different countries. (United Nations, 2020). Despite realising remarkable growth gains in the past two decades, African countries continue to record high levels of income inequality, casting doubts on the achievement of Sustainable Development Goals (SDGs) 5 and 10 (United Nations, 2020, 2019; World Bank, 2020). Sub-Saharan Africa faces challenges when it comes to tackling growth and inequality together. When measured by the Gini coefficient, Sub-Saharan Africa has a higher mean and median level of income inequality (0.43 and 0.41), when compared with economies in the rest of the developing world (0.39 and 0.38) (Bhorat, 2015). According to Chandy and Seidel (2017), among the five countries with the highest levels of income and wealth inequality globally, four of them (Zambia, Swaziland, Namibia, and South Africa) are located in Sub-Saharan Africa. The need to equalise incomes in settings like this rests on the argument that in societies where within and between-household inequalities are low, there is social cohesion, low corruption, and durable growth (Asongu & Nwachukwu, 2016; Alvaredo et al., 2018; Atkinson, 2016; Pickett & Wilkinson, 2015; Bourguignon, 2017). In this context, African leaders have increased their efforts to close the significant income gap within the continent, as shown by the introduction of the continental framework called 'The Africa We Want' (African Union, 2015). However, with the outbreak of the coronavirus pandemic, which triggered massive setbacks on SDGs 1, 5, 8, and 10 as Sachs et al. (2021), ILO (2020), and World Bank (2020) reported, the quest to foster social progress in Sub-Saharan Africa, and Africa as a whole has become challenging than ever.

While in the interim, efforts aimed at achieving high rates of economic growth are worthwhile, realising social progress in the long run remains the ultimate goal. The inflow of remittances has been identified as a significant factor for addressing the huge income gap in developing countries/regions such as Sub-Saharan Africa. The optimism regarding this lies in the power of remittances to spur growth and alleviate poverty in the developing countries and regions (see Azizi, 2021; Omar & Inaba, 2020; Pal et al., 2021; Peprah et al., 2019). In places with limited financial resources, such as Sub-Saharan Africa, remittances can help low-income families cover their everyday living costs. But their impact goes further—they can also support investments in healthcare, education, and businesses (Nweke & Nyewusira, 2015; World Bank, 2018). Additionally, the potential contribution of remittances towards the equalisation of incomes in Sub-Saharan Africa is worth exploring, considering its resilience in the past two decades, even in the heat of the coronavirus pandemic (Cazachevici et al., 2020; Ratha et al., 2020).

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Sub-Saharan Africa (SSA) is experiencing significant growth in remittances, for example, from US\$31.656 billion in 2010 to US\$49.33 billion in 2019, representing 2.20% and 2.73% of Gross Domestic Product (GDP), respectively (World Bank, 2021). In 2020, Sub-Saharan Africa had the highest adverse COVID-19 remittance inflows impact with a decline of about 12.5 per cent. The World Bank attributed the 12.5% decline in remittances inflows to Sub-Saharan Africa to the 27.7% decline in remittances inflows in Nigeria, which accounts for more than 40% of remittances inflows in the Sub-Saharan Africa region (Ratha et al., 2020).

Although a plethora of prior contributions suggests that remittances can boost economic growth (see Fayissa & Nsiah, 2010; Kumar, 2013; Nyamongo et al., 2012; Olubiyi, 2014), there are also concerns that they heighten the income gap across developing nations (see Shen et al., 2010; Song et al., 2021; Pal et al., 2021). This study focuses on how remittances affect income inequality in Sub-Saharan Africa, drawing insights from the results of Letsoalo and Ncanywa (2021), who found that, over time, remittances can significantly lower income inequality in African countries.

Existing empirical literature predominantly focused on how remittances from abroad affect income differences in poorer countries. Some studies have shown that money sent back home from abroad can significantly reduce the income gap (Karim et al., 2022; Letsoalo & Ncanywa, 2021). Others, however, argue that remittances may exacerbate income inequality. (Ofori et al., 2022; Song et al., 2021;). The contentious nature of this topic is evident in the disparities between conventional ideas, hypothetical consequences, and empirical results. Additionally, insufficient attention has been directed toward empirical research on how remittances influence income inequality in Sub-Saharan Africa. These gaps in understanding are the motivation for this study. By utilizing a more recent dataset and employing robust econometric techniques, this study seeks to add to existing literature on how remittances affect growth in Sub-Saharan Africa.

RESEARCH OBJECTIVES

The broad objective of this study is to examine the relationship between remittances and income inequality in selected countries in Sub-Saharan Africa (Nigeria, Ghana, Senegal, Cameroon, the Republic of Congo, Democratic Republic of Congo, Kenya, Uganda, South Africa, and Zimbabwe). The specific objectives are:

1. To assess the impact of remittances on income inequality in the selected countries in Sub-Saharan Africa.
2. To investigate the causality between remittances and income inequality in the selected countries in Sub-Saharan Africa.

Research hypotheses

H₀₁: Remittances do not significantly affect income inequality in the selected countries in Sub-Saharan Africa.

H₀₂: There is no significant causality between remittances and income inequality in the selected countries in Sub-Saharan Africa.

The study is divided into five parts. The first part is an introduction. The other sections are arranged like this: section two covers the existing research and theories, section three explains the approach used in the study, section four shares the main results, and section five wraps up with suggestions for policies.

LITERATURE REVIEW

Conceptual Clarifications

Remittances

Remittances are money or goods sent by migrants to their families or friends in their home countries. These transfers constitute a crucial source of household income in many developing countries, contributing to poverty reduction, improving living standards, and supporting economic development (Jongwanich & Kohpaiboon, 2019).

Taylor and Mora (2023) conceptualized remittances as encompassing all current transfers, whether in cash or in kind, exchanged between resident and non-resident households. This definition broadens the concept to include not only money sent by migrants but also any transfers received, providing a more comprehensive view of the financial exchanges between migrants and their home nations. By mentioning both "made" and "received" transfers, it encapsulates the bidirectional flow of resources, which might include, for example, families back home sending goods or money to migrants abroad as well.

Remittance Trends in Sub-Saharan Africa

Remittance flows to Sub-Saharan Africa reached \$54 billion in 2023, a slight decrease of -0.3 percent from the previous year. Remittance flows to the region are projected to rise by 1.3 percent in 2024. The increase in remittances into the region helped several African countries with their balance of payments, which were facing problems like not enough food, dry weather, broken supply chains, heavy rains, and trouble paying back debts. For instance, in Ghana, the current account recorded a surplus in 2023Q3 due in part to a strong increase in remittances. Remittances coming into the region were almost 1.5 times bigger than FDI flows in 2023, and they were more stable. The biggest nations that received remittances in the region in 2023 were Zimbabwe, Kenya, Ghana, and Nigeria. Remittances have become the biggest source of foreign money for many countries in this region. For

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example, Kenya gets more money from remittances than from its main exports, like tourism, tea, coffee, and growing vegetables. Countries relying more on receipts of remittances as a share of GDP include the Gambia, Lesotho, Comoros, Liberia, and Cabo Verde. In the first three of these countries, remittances make up more than a fifth of their total economic output. (Ratha et. al, 2024).

Table 1. Growth rate (%) of remittances of the different regions of the globe.

Region	2017	2018	2019	2020	2021	2022	2023e	2024f	2025f
LMIC	9.2	9.7	5.0	-1.1	10.8	8.3	0.7	2.3	2.8
East Asia and Pacific	5.3	6.9	4.0	-8.0	-2.5	2.8	1.8	0.9	1.4
Europe and Central Asia	21.1	12.9	5.2	-7.0	15.4	18.1	-10.3	-1.9	3.6
Latin America and Caribbean	10.9	9.9	8.2	7.4	26.2	10.5	7.7	2.7	1.6
Middle East and North Africa	13.4	1.8	3.9	4.1	12.8	-3.2	-14.8	4.3	5.5
South Asia	6.0	12.3	6.1	5.2	6.7	12.4	5.2	4.2	4.1
Sub-Saharan Africa	9.6	17.1	0.9	-13.8	18.7	6.8	-0.3	1.5	1.5

Source: World Bank (2024). Note: e = estimate; f = forecast

Income Inequality

Income inequality refers to how unevenly income is distributed throughout a population. The less equal the distribution, the greater the income inequality. Income inequality is usually linked with wealth inequality, which refers to the unequal spread of wealth. People can be grouped in various ways to show different degrees and types of income inequality, such as gender or race-based income inequality. There are different tools, such as the Gini Index, that help measure how much income inequality exists in a group of people. Some of the causes of income inequality include: globalization, advances in technology, gender and race bias, education, economic Conditions, and taxation (Kopp, 2024).

The inequality in income has recently come to be viewed as part of the greatest challenges facing the world today. In recent years, the topic has dominated the agenda of the World Economic Forum (WEF), where the world's top political and business leaders attend. Their global risks report, based on input from more than 700 experts, identified inequality as the biggest threat to the global economy in 2017 (Elliott, 2017). World income inequality reflects the combination of income disparity between countries and within countries. Between-country income disparity refers to the difference in average incomes in different countries. Income disparities across countries explain approximately two-thirds of total world income inequality (Piketty & Zucman, 2015).

Income Inequality in Sub-Saharan Africa (SSA)

Africa's Pulse report of the World Bank reported that SSA stands out for its high and persistent levels of income disparity, which are second only to those of the Latin America and the Caribbean region. More than half of the countries in Sub-Saharan Africa with inequality data have a Gini index higher than 40. Moreover, countries in SSA exhibit inequality that is 10 Gini points higher on average than other regions for a given level of GDP (World Bank, 2024). The work of Chandy and Seidel (2017) shows that four out of the five most unequal countries in the world when it comes to income and wealth are located in Sub-Saharan Africa. These countries are South Africa, Namibia, Swaziland, and Zambia.

Sub-Saharan Africa continues to be one of the most unequal regions globally, even though the average unweighted Gini index in the region dropped by 3.4 percentage points between 1991 and 2011. The region contains ten of the nineteen most unequal countries in the world. Countries like South Africa, Zambia, the Central African Republic, Eswatini, Namibia, and Burkina Faso have extremely high levels of income inequality. On the other hand, Nigeria, Mauritius, Seychelles, and Gabon also have high inequality. There is a big difference in income inequality levels across Sub-Saharan Africa. The region's average and median income inequality are higher than those in other developing regions. (UNDP, 2017).

Theoretical Framework

This study is anchored on the dynamic migration model, mainly associated with Stark and Bloom (1985). Their work extended traditional static models by introducing dynamic elements (particularly intertemporal decision-making and remittances influencing migration behaviour over time). It is based on these propositions:

1. Migration is an intertemporal decision: Migrants weigh long-term costs and benefits, rather than responding only to immediate income differentials. Also, decisions depend on future expectations of income, employment, and family welfare.

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2. Remittances play a strategic role in migrant's families or households: Migrants send remittances home, influencing family decisions and local advancement. Migration can be seen as a household strategy for income diversification and investment.
3. Migration decisions are reversible and adaptive: Migrants can return home or re-migrate based on changing socio-economic conditions. The model captures the evolving nature of migration, influenced by feedback mechanisms and new information.
4. Non-economic factors are integrated: Social networks, family obligations, and aspirations shape migration patterns dynamically.

However, the Stark and Bloom (1985) model has its limitations. Some of the limitations include:

- It under-represents aspirations, cultural norms, and legal constraints (Carling & Schewel, 2018).
- It neglected structural changes that can abruptly alter migration (De Haas, 2010).
- Dynamic models are hard to apply due to their complexity and empirical demands, limiting their practical use for forecasting (Raymer & Rogers, 2007).

Relevance of the model to this study

The model provides a useful framework for understanding the relationship between remittances and income disparity in SSA. This model treats migration as a forward-looking, intertemporal decision made by households seeking to maximize long-term returns (Borjas, 2014). In the SSA context, initial migration opportunities are often limited to relatively better-off households, which can afford the high costs of sending a member abroad. As a result, remittance inflows may initially raise income inequality. However, over time, social networks reduce information and transaction costs, enabling poorer households to also participate in migration (Stark & Bloom, 1985). As access to remittances broadens and funds are increasingly used for human capital advancement alongside investment in productive activities, remittances can have an equalizing effect on the income gap (Rapoport & Docquier, 2006). Thus, the model highlights the dynamic and time-sensitive nature of remittance impacts, emphasizing that their influence on inequality is neither immediate nor uniform but unfolds through evolving household behaviour, feedback effects, and policy conditions.

Empirical Review

Previous studies have shown that the relationship between migrant remittances and income gap in developing nations is still ambiguous. Existing studies have shown that foreign remittances have a mixed effect on income inequality in countries of origin (Rapoport & Docquier, 2006). Some earlier work has reported that remittances can help reduce income inequality, as seen in the study by Letsoalo and Ncanywa (2021). However, other studies have found different results, such as those by Ofori et al. (2022) and Song et al. (2021).

Anwar et al. (2024) carried out a meta-analytic investigation on the relationship between remittances and inequality in recipient countries, using advanced meta-analysis techniques (Bayesian model averaging) to analyse 578 estimates reported in 45 studies. The overall finding is that remittances impacted income inequality negatively, but economically, it was small. However, strong regional differences exist, with remittances adding to increased inequality in South Asia, while having a significant inequality-reducing impact in Eastern Europe, East Asia, and Latin America. In the Middle East, North Africa, and Sub-Saharan Africa, only a marginal economic impact is found. The authors recommended that future studies should control for institutional quality, educational attainment, and income level to improve the accuracy of estimates.

Ofori et al. (2022) looked at how remittances and financial development affect income inequality in Africa, covering 42 African countries from 1996 to 2020, using dynamic GMM estimation. Their findings showed that remittances tend to increase income inequality in Africa. However, the financial system isn't strong enough to help distribute these remittances more evenly. The study suggests that focusing on developing Africa's financial sector could lead to more balanced income distribution. They advised African governments to work with financial institutions to build a strong and efficient financial system.

Letsoalo and Ncanywa (2021) investigated the impacts of external financial flows on income inequality in the Southern African Development Community (SADC) region, which includes nine SADC member states (South Africa, Botswana, Tanzania, Malawi, Mauritius, Zambia, Angola, Mozambique, and Madagascar) covering the period 1995–2018. The study used a panel ARDL and Granger causality techniques. The findings are that in the long run, remittances strongly reduce inequality, while FDI and cross-border lending increase it, and foreign aid has only a minor reducing effect. In the short run, FDI and cross-border lending drive inequality, whereas remittances and foreign aid show no significant influence.

Tokhirov (2021) investigated the effect of foreign remittances on income inequality in the post-communist region, using data from 27 countries between 1991 and 2014. The study employed static and dynamic panel models (Fixed effects model & System GMM). The results revealed that income inequality progresses along a U-shaped course as a country becomes more dependent on remittances. For most countries, the relationship between remittances and inequality is inverse. According to the author, the

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findings challenged the notion that remittances should only be viewed as a pro-poor redistribution mechanism because, in certain cases, additional migrant transfers may actually raise income inequality.

Song et al. (2021) empirically examined how remittance inflows, FDI, and economic growth affect income inequality in 20 high remittance receiving developing countries from 1980 to 2016. The study employed panel cointegration and the Dynamic OLS estimation technique. The results revealed that a rise in FDI inflows and remittances raises income inequality, whereas economic growth decreases it. The study recommended that appropriate policies should be put in place to ensure that remittances and FDI inflows are used effectively to reduce income inequality in developing economies.

Bkwayep and Tsafack (2020) studied the effect of remittances and financial inclusion on income inequality in 47 African countries between 2004 and 2014. The study used the GMM estimation technique. The results showed that remittances and financial inclusion lower income inequality. The results further indicate that financial inclusion amplifies the impact of migrant remittances on income inequality. They concluded that the complementary action of financial inclusion on migrants' remittances offers a wider chance to financial services, which also leads to a rise in remittances and therefore reduces income inequalities.

Tsaurai (2020) investigated the personal remittances-unemployment-income inequality nexus in the case of emerging markets between 2003 and 2016. The study employed fixed effects, random effects, and pooled OLS & dynamic GMM estimation techniques. The results across all four econometric estimation methods produced results that show that the complementarity between personal remittances and unemployment reduced income inequality. The study recommended that emerging markets should craft and implement proper remittances inflow harnessing policies to ensure that they contribute towards both income inequality and unemployment reduction efforts.

Borja and Hall (2018) investigated the effect of remittances and institutions on income disparity in developing nations, using 79 countries over a 20-year period from 1990 to 2010, broken into 4-year non-overlapping periods. It used instrumental variables and the two-stage least squares (2SLS) method of analysis. The results showed that remittance recipient nations with better institutions have a more meaningful reduction in income gap. The effect was stronger among heavy remittance-recipient countries.

Adams and Klobodu (2017) looked at how different types of capital flows affect income distribution in 21 Sub-Saharan African countries from 1984 to 2013, using the panel vector autoregressive (PVAR). The findings showed that FDI has a moderate positive effect on income inequality, meaning it tends to increase income gaps both in the short term and over the long term. On the other hand, remittances, external debt, and aid don't have a strong impact on income inequality. Additionally, the study found that the effect of capital flows on income inequality varies from country to country in the region.

Anyanwu et al. (2016) empirically assessed the effect of key domestic and external drivers of income inequality in 17 West African countries between 1970 and 2011, using the dynamic system GMM technique. The results showed that remittances had a positive effect on income inequality in West Africa. The results showed evidence of the existence of the Kuznets curve in the sub-region, which proposed that inequality may rise with the initial increase in per capita income but will decline subsequently.

Akobeng (2015) investigated how remittances affect income inequality in 41 countries in Sub-Saharan Africa between 1981 and 2010, using the two-step SLS-IV and dynamic two-step SGMM approaches. The results indicated that remittances have income-equalizing effects. Additionally, remittances contribute to poverty reduction; however, the magnitude of this effect varies according to the poverty indicator applied. The author recommended the need for a sound macroeconomic system and development approaches encompassing the whole economy with strong involvement of the financial segment.

Anyanwu (2011) investigated the effect of migrant remittances on income inequality in Africa between 1960 and 2006, using both the Ordinary Least Squares (OLS) and Instrumental Variable GMM estimation methods. The results suggested that foreign migrant remittances have a significant positive effect on income inequality. The result was mediated by several macroeconomic indicators, such as initial GDP and inflation, and varies by sub-regions within Africa.

Adenutsi (2011) looked at how international remittances affect poverty and income inequality in sub-Saharan Africa (SSA) by studying 36 countries from 1980 to 2009 using system GMM. The findings showed that in countries where income gaps are not too big, remittances help make incomes more equal. But in countries where income gaps are larger, remittances can actually make income inequality worse. The study also found that remittances help reduce poverty, but the poorest people don't benefit as much. Overall, the study concluded that remittances have a big potential to help balance incomes in SSA.

METHODOLOGY

This study adopts an ex post facto research design. The independent variables are remittances (REM), GDP Per Capita Growth (GDPPCG), and Aging Population (AP), while the dependent variable is Gini Index (proxy for income inequality). The study employed annual secondary data, which were sourced from World Bank Development Indicator (WDI) and World Income

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Inequality Database (WIID) between 2000 and 2023 for 10 countries in Sub-Saharan Africa (which includes Nigeria, Ghana, Senegal, Cameroon, Democratic Republic of Congo, Republic of Congo, Kenya, Uganda, South Africa, and Zimbabwe).

Estimation Technique: Given the existence of cross-sectional dependence in the panel data based on the cross-sectional dependence test, this study employed Panel Estimated Generalized Least Squares (EGLS) method with cross-section Seemingly Unrelated Regression (SUR) weights. This estimator provides efficient and consistent estimates by correcting for potential correlation of error terms across cross-sectional units (countries) and heteroskedasticity in the data. The use of SUR weights ensures that contemporaneous correlations between countries are accounted for, thereby improving the robustness of the estimated coefficients. Traditional estimators, such as Fixed Effects and Random Effects, assume homoskedasticity and cross-sectional independence, which would lead to inefficient and potentially biased estimates under these conditions. To address these issues, this study employed the Panel Estimated Generalized Least Squares (EGLS) with cross-section Seemingly Unrelated Regression (SUR) weights. This method is specifically designed to account for contemporaneous correlation across cross-sections and heteroskedasticity, thereby producing more efficient and reliable coefficient estimates compared to conventional panel estimators.

Table 2. Summary of the source and description of data.

Variable	Symbol	Description of the variables	Source
GDP Per Capita Growth	GDPPCG	GDP per capita growth is measured by the annual % growth rate of GDP per capita.	WB-WDI (2024)
Gini Index	GINI	The Gini Index indicates how much a distribution diverges from complete equality. A value of 0 signifies perfect equality, whereas a value of 100 reflects absolute inequality.	WB-WDI (2024) and WIID (2024)
Aging Population	AP	Aging Population, measured by population ages 65 and above as the % of the total population. The population is defined using the de facto approach, which includes all residents, irrespective of their citizenship or legal status.	WB-WDI (2024)
Remittances	REM	Remittance is measured by remittances received as a % of GDP.	WB-WDI (2024)

Source: Authors' computation

Model Specification

In specifying the model for analysing the impact of remittances on income inequality in the selected countries in SSA, this study adopted and modified the model specification of Borja and Hall (2018). The study investigated the influence of remittances and institutions on income inequality in developing countries. The model was adopted in this study because it specifically analysed how remittances affect income inequality in these countries. The model is stated as:

$$Gini_{it} + \beta_0 + \beta_1 GDPPCG_{it} + \beta_2 GDPPCG_{it}^2 + \beta_3 EDU_{it} + \beta_4 REM_{it} + \beta_5 IQI_{it} + \gamma_i + \epsilon_{it} \quad (1)$$

Where:

$Gini_{it}$ is the Gini coefficient for country i at time period t ; $GDPPCG$ is GDP per capita; $GDPPCG_{it}^2$ represents the squared value of GDP per capita; EDU is education, defined as the percentage of population who completed secondary school; REM is remittances in current US\$, and IQI is the Institutional Quality Indicator. The parameter γ_i is the unobserved between-country effect, and ϵ is the error term. However, the model was modified to suit the objectives of this research. The modified model used in this research is stated as:

$$Gini_{it} = \beta_0 + \beta_1 GDPPCG_{it} + \beta_2 GDPPCG_{it}^2 + \beta_3 AP_{it} + \beta_4 REM_{it} + \mu_{it} \quad (2)$$

Where:

$Gini_{it}$ = Gini Index for country i at time period t , a measure of income inequality

$GDPPCG$ = GDP per capita growth, a measure of economic growth

$GDPPCG^2$ represents the squared value of real GDP per capita growth

AP_{it} = aging population, measured by Population ages 65 and above as the percentage of the total population.

REM_{it} represents remittances, measured by personal remittances received (% of GDP). μ is the error term. β_0 , β_1 , β_2 , β_3 , and β_4 are the slope parameters to be estimated. Where $\beta_1, \beta_2, \beta_4 < 0$, $\beta_3 > 0$.

These control variables are in line with the broader literature on income inequality (Milanovic 1994; Deininger & Squire 1997; Calderon & Chong 2000). The squared GDP per capita value controls for the inverted U-shaped dynamic of inequality during the

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course of economic development as described in Kuznets (1955) and Barro (2000). An aging population is generally known to aggravate income inequality (Lindert, 1978). Recent studies have also confirmed a positive association between an aging population and income inequality. Older workers are more likely to retire from the labour market, which implies that a higher share of the retired results in a reduction in average household income, which accordingly intensifies income inequality (Hwang et al., 2021).

Pre-Estimation Tests

Cross-Sectional Dependency Test: A Cross-Sectional Dependency (CSD) test is used to check whether the residuals (error terms) of the cross-sectional units (e.g., countries, firms, regions) are independent of each other. This study adopted the Breusch-Pagan LM, Pesaran scaled LM, and Pesaran CD tests. In reality, countries, firms, or regions often interact with each other (through trade, policies, shocks, etc.). This leads to cross-sectional dependence. If ignored, it can cause biased test statistics, spurious results, and invalid inferences.

Panel unit root test: This test is used to ascertain whether variables in a panel dataset are stationary or have a unit root (i.e., are non-stationary). This study employed the second generational unit root test (Bai and Ng – PANIC test) to address cross-sectional dependence that existed in the panel series.

Panel cointegration test: A panel cointegration test is used to ascertain whether a long-run equilibrium relationship exists among variables in a panel data set. This study employed the Pedroni panel cointegration test and the Kao residual cointegration test.

Causality test: Granger (1969) developed a methodology for analysing the causal relationships between time series. Dumitrescu and Hurlin (2012) provide an extension designed to detect causality in panel data. Given that $x_{i,t}$ and $y_{i,t}$ are the observations of two stationary variables for individual i in period t . Coefficients are allowed to differ across individuals, but are assumed to be time invariant. This study adopted the Pairwise Granger Causality test in examining the causality between the dependent variables and the independent variables of interest.

RESULTS AND DISCUSSION

This section presents and discusses the results obtained. The section starts with the preliminary tests and gradually moves to the actual estimated results.

Table 3. Descriptive Statistics of Variables

	GDPPCG	GINI	REM	AP
Mean	1.430792	47.98463	3.074286	3.195898
Median	1.810000	56.01000	2.131104	3.084473
Maximum	19.51000	72.73000	13.61145	6.515094
Minimum	-18.65000	0.000000	0.000000	1.670000
Std. Dev.	4.145602	19.54629	3.307327	0.879205
Skewness	-0.867558	-1.635162	1.135458	1.537241
Kurtosis	8.953929	4.549086	3.369999	5.911880
Jarque-Bera	384.5990	130.9469	52.93956	179.3149
Probability	0.000000	0.000000	0.000000	0.000000
Observations	240	240	240	240

Source: Authors' computation using EViews 12

Table 3 presents the descriptive statistics of the variables. GDP per capita growth rate (GDPPCG) averaged 1.43%, with a wide range (−18.65% to 19.51%), indicating the presence of substantial economic booms and deep recessions in the period of the study. The negative skewness and high kurtosis suggest a distribution dominated by low or negative growth and occasional extreme values. The Gini index (GINI) averaged 47.98, reflecting moderate-to-high income inequality. The Gini index (GINI) is negatively skewed with a leptokurtic distribution (indicating a clustering of high inequality values and frequent extremes). Remittances (REM) averaged 3.07%, but the positive skewness indicates that most countries received relatively low inflows, with a few heavily dependent on them. The aging population (AP) averaged 3.20% (indicating a high youthful population). However, the positive skewness shows a few countries with higher elderly proportions. The Jarque–Bera test confirms that all variables deviate significantly from normality, indicating the presence of outliers and extreme observations.

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Table 4. Matrix of Correlation Coefficients

Variable	GDPPCG	GINI	REM	AP
GDPPCG	1.00	-0.1261		
GINI	-0.1261	1.00		
REM	0.3058	-0.2100	1.00	
AP	-0.0584	0.0551	-0.0898	1.00

Source: Authors' computation using EViews 12

Table 4 presents the correlation coefficients among the variables. GDP per capita growth rate (GDPPCG), income inequality (GINI), remittances (REM), and aging population (AP). The results indicated that remittances and the Gini index show a weak negative correlation (-0.2100), implying that higher remittances may be associated with reduced income inequality, possibly through direct household transfers to lower-income groups. The Gini index and AP exhibit a very weak positive correlation (0.0551), suggesting little or no connection between an aging population and income inequality. GDPPCG has a weak negative correlation with the Gini index (-0.1261), implying that higher income inequality tends to be associated with slightly reduced economic growth. These results emphasize the significance of considering the interplay of various factors in comprehending income inequality dynamics in the region.

Table 5. Residual Cross-Section Dependence Test from Panel OLS Estimates

Test	Statistics	Prob.
Breusch-Pagan LM	119.0027	0.0000
Pesaran scaled LM	7.800569	0.0000
Pesaran CD	8.475309	0.0000

Source: Authors' computation using EViews 12

Table 5 shows the cross-sectional dependence test results from panel OLS estimates. A growing body of panel-data literature holds that panel data models are likely to display substantial cross-sectional dependence in the errors, which may arise due to strong interdependence among the cross-sectional units (Hoyos & Sarafidis, 2006). The cross-sectional dependence test results presented in Table 4.3 confirm the presence of cross-sectional dependence among the variables, since the probabilities of all test statistics are less than 0.05 at 5% significance level. Hence, a second generational unit root test, which accounts for cross-sectional dependence, was employed in ascertaining the stationarity of the panel series.

Table 6. Panel unit root test with cross-sectional dependence: Bai and Ng – PANIC test

Variables	Deterministic	Pooled Statistics	(P-Value)	Stationarity
GINI	Constant	+/-Inf	0.00000	Stationary
GDPPCG	Constant	+/-Inf	0.00000	Stationary
REM	Constant	2.63425	0.00843	Stationary
AP	Constant	+/-Inf	0.00000	Stationary

Source: Authors' computation using EViews 12

The second generational unit root test (Bai and Ng-PANIC test) is presented in Table 6. The result (based on the P-value of the test statistics) shows that panel data (variables) are stationary at 5% level of significance.

Table 7. Pedroni Residual Cointegration Test

Test	Statistics	Prob.
Panel v-Statistic	-0.232505	0.5919
Panel rho-Statistic	0.470803	0.6811
Panel PP-Statistic	0.042064	0.5168
Panel ADF-Statistic	2.039888	0.9793
Panel v-Statistic (weighted)	-0.418358	0.6622
Panel rho-Statistic (weighted)	0.846517	0.8014
Panel PP-Statistic (weighted)	0.643161	0.7399
Panel ADF-Statistic (weighted)	2.287097	0.9889

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Group rho-Statistic	2.112669	0.9827
Group PP-Statistic	1.743747	0.9594
Group ADF-Statistic	3.832172	0.9999

Table 8. Kao Residual Cointegration Test

t-Statistics	Prob.
1.597599	0.0551

Source: Authors' computation using EViews 12

From Tables 7 and 8 above, the Pedroni test shows that there is cointegration since the majority of the test statistics support the presence of cointegration among the panel variables at 5% significance level. Also, the Kao test rejects the null hypothesis of no cointegration at 5% significance level. Hence, we conclude that the variables in the model are cointegrated.

Table 9. Panel Regression Results

Dependent Variable: GINI	Sample: 2000 – 2023	Method: Panel EGLS – Cross-section SUR	
Variable	Coefficient	t-statistics	Prob.
GDPPCG	-0.068479	-0.621997	0.5345
AP	0.600325	0.941038	0.3477
REM	-1.105058	-8.742071	0.0000
SQU_GDPPCG	0.041447	4.101449	0.0001
C	46.98090	16.04398	0.0000
Mean dependent var	0.763923	S.D. dependent var	1.490137
R- Squared	0.310631	Adjusted R- Squared	0.298897
S.E. of regression	0.967915	F-statistic	26.47283
Prob. (F-statistic)	0.000000	D.W. statistic	1.742718

Source: Authors' computation using EViews 12

Table 9 is the panel regression results based on the Panel EGLS – Cross-section SUR method. From Table 4.7, the value of R-squared is 0.3106, which suggests that about 31.1% of the variation in GINI (proxy for income inequality) is explained by the independent variables. The Adjusted R-squared is 0.2989, which also suggests a moderately good fit model. The F-statistic (26.47) with probability (0.0000) means that the model as a whole is statistically significant. The Durbin-Watson statistic (1.74) suggests no serious autocorrelation (a value near 2 is ideal).

The coefficient of remittances (-0.1051) is negative and highly statistically significant (p-value = 0.0000). A unit rise in remittances is associated with a 0.1051 unit decrease in GINI (income inequality proxy). This suggests that remittances have a significant effect in lowering income inequality across the sampled countries in SSA.

The coefficient of GDPPCG (-0.069) is negative and statistically insignificant (p-value = 0.5345). A unit increase in GDPPCG is associated with a 0.069 unit decrease in GINI. This suggests that economic growth tends to lower income inequality across the sampled countries in SSA, though not significantly.

The coefficient of aging population (0.6003) is positive but statistically insignificant (p-value = 0.3477). A unit increase in AP is associated with a 0.6003 unit increase in GINI. This suggests that a higher aging population tends to raise income inequality across the sampled countries in SSA, though not significantly.

The coefficient of SQU_GDPPCG (0.04145) is positive and statistically significant. A unit increase in SQU_GDPPCG is associated with a 0.0415 unit increase in GINI. This suggests a Kuznets-type relationship (at low levels of growth, inequality might fall, but beyond a certain point, higher growth could increase inequality).

Table 10. Pairwise Granger Causality Test

Sample: 2000-2003	Lags: 2		
Null Hypothesis:	Obs	F-Statistics	Prob.
REM does not Granger-cause GINI	219	0.89211	0.4113
GINI does not Granger-cause REM		0.20791	0.8124

Source: Authors' computation using EViews 12

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The pairwise Granger causality results reveal no evidence of predictive causality in either direction between remittances (REM) and the Gini Index (GINI). Specifically, the null hypothesis that remittances do not Granger-cause income inequality was not rejected (F-statistic = 0.8921, and $p = 0.4113$). In the same vein, the null hypothesis that income inequality does not Granger-cause remittances was also not rejected (F-statistic = 0.2079, $p = 0.8124$).

DISCUSSION AND POLICY IMPLICATIONS OF FINDINGS

This research investigated the relationship between remittances and income inequality in selected countries in Sub-Saharan Africa (SSA) from 2000 to 2023. Findings indicated that remittances negatively and highly significantly impact the Gini Index (income inequality proxy) in the study period, which agrees with a priori expectations. This implies that remittances play a critical role in lowering income inequality across the sampled countries in the region. The strong and highly significant negative coefficient for remittances implies that policies aimed at facilitating migrant transfers, such as reducing transaction costs, improving financial infrastructure, and developing incentives for remittance inflows, could be effective tools for promoting a more equitable distribution of income in the region.

This result reaffirms the findings of previous studies. For instance, Letsoalo and Ncanywa (2021) discovered that remittances can significantly lower income inequality over time based on their study of nine selected countries in the Southern African Development Community. Similarly, Bkwayep and Tsafack (2020) discovered that migrant remittances decrease income inequality in Africa based on their study of 47 selected African countries. In the same vein, Akobeng (2015) concluded that remittances negatively impact income inequality in Sub-Saharan Africa. Also, Adenutsi (2011) found that foreign remittances negatively impact income inequality in Sub-Saharan Africa.

Further findings showed that GDP per capita growth alone does not significantly lower income inequality in SSA. However, the positive and significant coefficient of the square of GDP per capita growth suggests that the income distributional effect of growth depends on its stage and intensity. The results showed evidence of the existence of the Kuznets curve in the region, which proposed that inequality may rise with the initial increase in per capita income but will decline subsequently. This finding underscores the need for inclusive growth strategies that ensure the advantages of economic expansion are widely shared, particularly at higher growth levels. Economic growth is often measured by the increase in GDP (Owamah, and Mgbomene, 2025). A nation is said to have grown if its total output goes up over a certain time (Owamah, and Mgbomene, 2025).

The positive but insignificant relationship between an aging population and income inequality implies that demographic shifts (in favour of a younger population) may become a more relevant policy concern in the future in SSA, especially as population structures change over time.

The findings also showed no causality in either direction between remittances and the income inequality across the sampled countries in the period of study, implying that remittances are not an important driver of income inequality in the region.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Despite the significant rise in remittances in SSA, the region has continued to face challenges when it comes to tackling income inequality, as the region stands out for its high and persistent levels of income inequality. This study examined the relationship between remittances and income inequality in selected Sub-Saharan African countries from 2000 to 2023. The results indicated that remittances negatively and significantly impact income inequality across the selected countries in the period of study. The result also revealed no causality in either direction between income inequality and remittances across the selected countries in the selected countries. This study concludes, therefore, that remittances play an important role in reducing income inequality in Sub-Saharan Africa.

Recommendations

Drawing from this study's findings, the following recommendations are made:

1. Given that remittances significantly reduce inequality, Sub-Saharan Africa should strengthen remittance inflows into the region by: encouraging formal remittance channels (which lowers remittance transaction costs), negotiating bilateral remittance arrangements with countries hosting large diasporas to reduce fees and improve transfer speed, and promoting mobile money platforms to ensure remittances reach rural and unbanked populations efficiently.
2. Given the evidence of existence of the Kuznets curve in the sub-region, which proposed that inequality may rise with the initial increase in per capita income but will decline subsequently, countries in SSA should promote inclusive growth by: focusing on pro-poor growth strategies (like rural infrastructure, agricultural modernization, and SME support), investing in

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social safety nets (cash transfers, job training), and preventing growth-driven inequality at higher growth levels (through progressive taxation, education access, and skills upgrading programs).

3. Given that an aging population contributes to income inequality (though insignificantly), countries in this region should address aging population concerns by investing in health care and active aging programs, and reforming pension systems to ensure sustainability and equity.

The study suggests future research should focus on single-country analyses to create policies tailored to each nation's growth conditions, using relevant time series methods.

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